WHAT IS CLAIMED:

1. A detector for determining the presence of an oligonucleotide target having a target nucleotide sequence comprising;

an electrode capable of sensing redox events in a redox moiety and

an oligonucleotide probe immobilized on the electrode,

with at least one of the target and the probe comprising a redox moiety, the probe having a probe nucleotide sequence which hybridizes with the target nucleotide sequence and,

in the absence of hybridization between the target and the probe, at least one redox moiety being located in a first position relative to the electrode and, in the presence of hybridization between the target and the probe, said at least one redox moiety being located in a second position relative to the electrode, said first and second positions giving rise to distinguishable redox events detectable by the electrode.

2. The detector of claim 1 wherein the first position is closer to the electrode than the second position.

3. The detector of claim 1 wherein the second position is closer to the electrode than the first position.

4. The detector of claim 1 where one of the probe and the target comprises a redox moiety.

5. The detector of claim 1 wherein the probe comprises a redox moiety.

6. The detector of claim 1 wherein the target comprises a redox moiety.

7. The detector of claim 5 wherein the probe is immobilized on the electrode at a position distant from the redox moiety.

8. The detector of claims 1 wherein the electrode is capable of inducing redox events in the redox moiety.

9. The detector of claim 1 wherein in the absence of hybridization with the target the first configuration comprises internal hybridization between two regions in the probe.

10. The detector of claim 9 wherein the second configuration comprises a disrupted internal hybridization as the result of hybridization between a region in the probe and a complementary region in the target.

11. The detector of claim 9 wherein the probe in its first configuration is a stem and hairpin configuration with the stem immobilized on the electrode and with the redox moiety attached to the end of the probe distal to the stem.

12. The detector of claim 1 wherein the second configuration comprises internal hybridization between two regions in the probe.

13. The detector of claim 1 wherein the second configuration comprises a loop comprising a region of the target and a region of the probe.

14. The detector of claim 1 wherein the electrode comprises a metal.

15. The detector of claim 14 wherein the metal is gold.

16. The detector of claim 1 wherein the redox moiety is selected from the group consisting of purely organic redox labels, viologen, anthraquinone, ethidium bromide, daunomycin, methylene blue, and their derivatives, organo-metallic redox labels, ferrocene, ruthenium, bis-pyridine, tris-pyridine, bis-imidizole, and their

derivatives, and biological redox labels, cytochrome c, plastocyanin, and cytochrome c'.

17. A detector for determining the presence of a oligonucleotide target having a target nucleotide sequence comprising,

an electrode capable of sensing redox events in a redox moiety and

an oligonucleotide probe immobilized on or proximate to the electrode and comprising a first region, a second region , a third region, a fourth region and a fifth region,

the first region being immobilized on or proximate to the electrode,

the fifth region being bound to a redox moiety,

the second, third and fourth regions being present in the probe intermediate said first and fifth regions,

the second and fourth regions being capable of hybridizing one another and being spaced apart from one another by the third region,

the third region being of hairpin-forming length such that when the second and fourth regions hybridize one another a hairpin is formed and the fifth region with its bound redox moiety is brought into redox-detectable proximity to the electrode,

at least a portion of the second, third and fourth regions including a sequence capable of forming a target hybrid with the target nucleotide sequence, the formation of the target hybrid interfering with the hybridization between the second and fourth regions and interfering with the redox moiety being brought into redox-detectable proximity to the electrode.

18. The detector of claim 17 additionally comprising a detector for detecting electron transduction between the electrode and the redox moiety when the hairpin is formed.

19. The detector of claim 18 additionally comprising an inductor for inducing electron transduction between the electrode and the redox moiety when the hairpin is formed.

20. The detector of claim 19 wherein the first region is at one end of the probe.

21. The detector of claim 20 wherein the fifth region is at the second end of the probe.

22. The detector of claim 17 wherein the electrode comprises a metal.

23. The detector of claim 22 wherein the metal is gold.

24. The detector of claim 17 wherein the redox moiety is selected from the group consisting of purely organic redox labels, viologen, anthraquinone, ethidium bromide, daunomycin, methylene blue, and their derivatives, organo-metallic redox labels, ferrocene, ruthenium, bis-pyridine, tris-pyridine, bis-imidizole, and their derivatives, and biological redox labels, cytochrome c, plastocyanin, and cytochrome'.

25. A detector for determining the presence of a oligonucleotide target having a target nucleotide sequence said detector comprising;

an electrode capable of sensing redox events in a redox moiety and

an oligonucleotide probe comprising a first region, a second region and a third region,

the first region being immobilized upon or proximate to the electrode,

the third region being bound to a redox moiety,

the second region being present in the probe intermediate the first and third regions and comprising a first nucleotide sequence which is complementary to and spaced apart from a second nucleotide sequence with which it self hybridizes to form a first loop which positions the redox moiety a first distance from the electrode, said first nucleotide sequence also hybridizing with the target nucleotide sequence in the target, such hybridizing with the target disrupting the first loop and permitting complementary nucleotide sequences in the second region to self hybridize to form a second loop which positions the redox moiety a second distance from the electrode, said first and second distances giving rise to distinguishable redox events detectable by the electrode.

26. The detector of claim 25 wherein the first distance and the second distance give rise to distinguishable redox events detectable by the electrode.

27. The detectors of claim 26 wherein the second distance is shorter than the first distance.

28. The detector of claim 25 additionally comprising a detector for detecting electron transduction between the electrode and the redox moiety when the second loop is formed.

29. The detector of claim 28 additionally comprising an indicator for inducing electron transduction between the electrode and the redox moiety when the second loop is formed.

30. The detector of claim 29 wherein the first region is at one end of the probe.

31. The detector of claim 29 wherein the third region is at the second end of the probe.

32. The detector of claim 27 wherein the electrode comprises a metal.

33. The detector of claim 33 wherein the metal is gold.

34. The detector of claim 33 wherein the redox moiety is selected from the group consisting of purely organic redox labels, such as viologen, anthraquinone, ethidium bromide, daunomycin, methylene blue, and their derivatives, organo-metallic redox labels, such as ferrocene, ruthenium, bis-pyridine, tris-pyridine, bis-imidizole, and their derivatives, and biological redox labels, such as cytochrome c, plastocyanin, and cytochrome.

35. A detector for determining the presence of an oligonucleotide target having a target nucleotide sequence comprising;

an electrode capable of sensing redox events in a redox moiety and

an oligonucleotide probe immobilized on the electrode,

the target comprising a redox moiety, the probe having a probe nucleotide sequence which hybridizes with the target nucleotide sequence and,

in the absence of hybridization between the target and the probe, the redox moiety being located in a first position relative to the electrode and, in the presence of hybridization between the target and probe the redox moiety being located in a second position relative to the electrode, said first and second positions giving rise to distinguishable redox events detectable by the electrode.

36. The detector of claim 35 wherein the first position is closer to the electrode than the second position.

37. The detector of claim 35 wherein the second position is closer to the electrode than the first position.

38. The detector of claims 35 wherein the electrode is capable of inducing redox events in the redox moiety.

39. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 1 and sensing redox events in the redox moiety with the electrode in the presence of the sample and in the absence of the sample and,

correlating similarity in redox events between the two sensings with the absence of the target and a change in redox events with the presence of the target.

40. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 1 and sensing redox events in the redox moiety with the electrode and,

correlating the sensed redox event with at least one sensed redox even sensed in the presence of and/or the absence of the target.

41. The method of claim 39 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

42. The method of claim 40 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

43. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 17 and sensing redox events in the redox moiety with the electrode in the presence of the sample and in the absence of the sample and,

correlating similarity in redox events between the two sensings with the absence of the target and a change in redox events with the presence of the target.

44. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 17 and sensing redox events in the redox moiety with the electrode and,

correlating the sensed redox event with at least one sensed redox even sensed in the presence of and/or the absence of the target.

45. The method of claim 43 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

46. The method of claim 44 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

47. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 25 and sensing redox events in the redox moiety with the electrode in the presence of the sample and in the absence of the sample and,

correlating similarity in redox events between the two sensings with the absence of the target and a change in redox events with the presence of the target.

48. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 25 and sensing redox events in the redox moiety with the electrode and,

correlating the sensed redox event with at least one sensed redox even sensed in the presence of and/or the absence of the target.

49. The method of claim 47 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

50. The method of claim 48 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

51. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 35 and sensing redox events in the redox moiety with the electrode in the presence of the sample and in the absence of the sample and,

correlating similarity in redox events between the two sensings with the absence of the target and a change in redox events with the presence of the target.

52. A method for detecting the presence of an oligonucleotide target having a target nucleotide sequence in a sample comprising:

contacting the sample under oligonucleotide hybridization conditions with the detector of claim 35 and sensing redox events in the redox moiety with the electrode and,

correlating the sensed redox event with at least one sensed redox even sensed in the presence of and/or the absence of the target.

53. The method of claim 51 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

54. The method of claim 52 wherein the target is associated with an object and wherein the sensing of the presence of the target is correlated with the authenticity of the object.

55. A method for authenticating an object comprising:

obtaining a detector of claim 1,

associating the object with the target,

sensing the presence of the target associated with the object; and

correlating the sensing of the presence of that target oligonucleotide with the authenticity of the object.

56. The method of claim 55 wherein the sensing is carried out in the presence of masking oligonucleotides.

57. A method for authenticating an object comprising:

obtaining a detector of claim 17,

associating the object with the target,

sensing the presence of the target associated with the object; and

correlating the sensing of the presence of that target oligonucleotide with the authenticity of the object.

58. The method of claim 57 wherein the sensing is carried out in the presence of masking oligonucleotides.

59. A method for authenticating an object comprising:

obtaining a detector of claim 25,

associating the object with the target,

sensing the presence of the target associated with the object; and

correlating the sensing of the presence of that target oligonucleotide with the authenticity of the object.

60. The method of claim 59 wherein the sensing is carried out in the presence of masking oligonucleotides.

61. A method for authenticating an object comprising:

obtaining a detector of claim 35,

associating the object with the target,

sensing the presence of the target associated with the object; and

correlating the sensing of the presence of that target oligonucleotide with the authenticity of the object.

62. The method of claim 61 wherein the sensing is carried out in the presence of masking oligonucleotides.